Confirmation No. 7054

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Applicant	:	Da Palma, et al.
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Examiner	:	Bayard, Djenane M.
Docket No.	:	6169-170
IBM Docket No.	:	BOC9-2000-0037

DECLARATION UNDER 37 C.F.R. § 1.131

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22203-1450

Sir:

I, Wendi L. Nusbickel, a citizen of the United States of America, residing at 824 Dover Street, Boca Raton, FL 33487, hereby declare and state as follows:

6. I was employed by International Business Machines Corporation (IBM) of Boca Raton, Florida at the time the above-identified application was conceived and continue to be employed by IBM. I make this declaration in support the above-identified application.

7. IBM has invested substantial time and effort into the research, development, and marketing of their products, and in an effort to protect its rights in all new inventions, IBM requests that all employees prepare and submit IBM Confidential Invention Disclosure Forms upon conception by the inventor(s).

8. As a named co-inventor for this invention, I submitted the attached IBM Confidential Invention Disclosure BOC8-2000-0039.

9. I make this Declaration to establish that I co-conceived of the present invention at least as early as April 24, 2000, and exercised due diligence from prior to

April 24, 200 to August 28, 2000, the filing date for the above-identified patent application.

10. I further declare that all statements made herein of my own knowledge are true and all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code, and that such willful, false statements may jeopardize the validity of the above-identified patent application or any patent issuing thereon.

Wendi L Nusbickel
Wendi L. Nusbickel
Date: 1-29-04

STATE OF FLORIDA)
) ss:
COUNTY OF PALM BEACH)

The foregoing instrument was sworn to and subscribed before me this 29 day of January, 2004, by WENDI L. NUSBICKEL, who is [✓ personally known] to me or who has produced ________________ (type of identification) as identification.

Elaine P Venturelli
NOTARY PUBLIC,
STATE OF FLORIDA
Elaine P. Venturelli
(Print. Type or Stamp Commissioned Name of Notary Public)

NOTARY PUBLIC STATE OF FLORIDA
OFFICIAL NOTARY SEAL
ELAINE P VENTURELLI
COMMISSION NUMBER
CC911550
MY COMMISSION EXPIRES
MAR. 14,2004

Disclosure BOC8-2000-0039

Created By: Wendi Nusbickel **Created On:** 03/15/2000 07:53:41 AM
Last Modified By: Wendi Nusbickel **Last Modified On:** 04/24/2000 05:39:41 PM

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Required fields are marked with the asterisk (*) and must be filled in to complete the form .

Summary

Status	Under Evaluation
Processing Location	BOC
Functional Area	Speech Development & Customization (O. Osborne)
Attorney/Patent Professional	Richard Tomlin/Boca Raton/IBM
IDT Team	Harvey Ruback/West Palm Beach/IBM
Submitted Date	04/24/2000 07:14.38 AM
Owning Division	SWG
[redacted]	To calculate a PVT score, use the 'Calculate PVT' button.
Incentive Program	
Lab	
Technology Code	

Inventors with Lotus Notes IDs

Inventors: Wendi Nusbickel/Fort Lauderdale/IBM, William D Palma/Fort Lauderdale/IBM

Inventor Name > denotes primary contact	Inventor Serial	Div/Dept	Manager Serial	Manager Name
Nusbickel, Wendi L.	849720	7G/SZ5A	118109	Aldous, Anne M.
Da Palma, William V.	1A4024	7G/SZ5A	118108	Aldous, Anne M.

Inventors without Lotus Notes IDs

IDT Selection

IDT Team: Harvey Ruback/West Palm Beach/IBM	Attorney/Patent Professional: Richard Tomlin/Boca Raton/IBM

Response Due to IP&L : 05/24/2000

Main Idea

***Title of disclosure (in English)**
Method of Spliting a Java Management Extensions (JMX) Agent between Java Virtual Machines (JVM)s or Hosts

***Idea of disclosure**
1. Describe your invention, stating the problem solved (if appropriate), and indicating the advantages of using the invention.
This invention defines a method to extend the reach of the emerging industry standard for Java application management to the enterpise environment. It does so by enhancing this Java application management technology so it can manage remote applications (in other JVMs or host machines) as well as local applications (what it is currently defined for) Specifically, this method splits the function of a Java

Management Extensions (JMX) agent across JVMs or hosts using the standard JMX "connector" architecture. This enables JMX management of applications that cross JVM or host boundanes.

BACKGROUND
The Java Management Extensions or JMX, is a specification and set of runtime classes, whose purpose is to provide management of Java applications. It consists of an architecture, framework, APIs, design patterns, and services. It was developed by Sun, IBM and other major companies through the Java Community Process, and is viewed as an emerging industry standard for management by/of Java applications. The Reference Implementation or RI of the specification is available for the public on the Sun web site. The JMX architecture, APIs and management services are divided into three levels:

- Instrumentation level
  Manageable resources or applications implement JavaBeans called "managed" Beans or MBeans. These MBeans expose properties or methods that the application wishes to expose to the system management agent of the network. An example of this would be a "shutdown()" method to allow the application to be stopped from the agent.
- Agent level
  The agent controls the resources or applications within a single Java Virtual Machine (JVM). This level of the architecture contains the framework for communication with the resources as well as the object container where the resources will be instantiated. This set of services for handling MBeans is referred to as an "MBean server". Also contained at this level is at least one communications "connector" which facilitates the use of this agent by the manager level (remote).
- Manager level
  This layer Interfaces with the agent remotely to perform actions on the resources, such as the "shutdown()" request. The manager resides in a different JVM or host than the agent.

The current Sun Java Management Extensions Instrumentation and Agent Specification, V1.0.specification describes an architecture where the JMX agent resides in the same Java Virtual Machine or JVM as the managed resources, with the management application running outside of the JVM or "remote". A "connector" (shown below by the boxed C) provides remote access between the agent level and the manager level. Figure 1 illustrates the standard JMX architecture.

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JMX Architecture

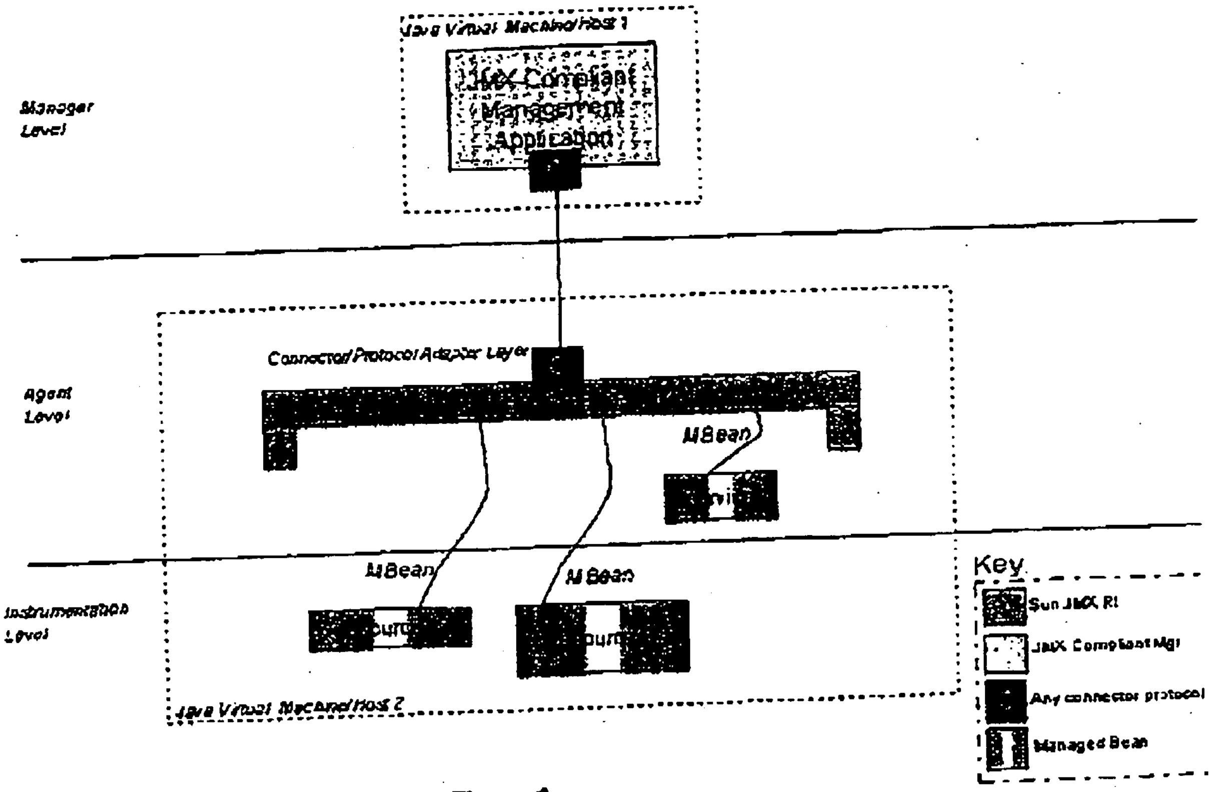

Figure 1

PROBLEM
The specification JMX model works well when the managed resources all reside within the same JVM (process) on the same system. The problem is, it does not address an architecture where the managed resources (applications) each reside in their own JVM or host system.

SOLUTION
The problem is solved by splitting the agent level into 2 pieces so that remote applications (outside JVM or host) can be controlled by the agent. The 2 pieces are:

- Mini Agent
  The first piece is a small "mini" agent that resides in each JVM (or host) of the managed application. This agent accesses the resources in its local JVM and starts up the MBean server and communication code needed. The "connector" server exposes the MBean server of this "mini" agent to remote clients. This means that local MBeans that are placed into this MBean server are accessible remotely by the remote "master" agent (a client of this "connector" MBean server). The "mini" agent starts up the Rmi "connector" server in the JVM/host of the resources, and communicates with the "master" agent, informing it of the presence of the "mini" agent and its MBeans.
- Master Agent
  The second piece is the "master" agent which resides in its own JVM as defined in the JMX architecture. The management level communicates with the "master" agent to manage the resources. But instead of the "master" agent interfacing with the managed beans of the resources in the same JVM, it interfaces with the remote MBeans controlled by the "mini" agent JVMs/hosts. The "mini" agents reside in JVMs or hosts of the managed resources and communicate with the "master" agent, granting it access to the "mini" agents MBean Server and thus its MBeans. Figure 2 illustrates the JMX architecture with the split agent level.

This invention uses the JMX "connector" interface between the "split" agent to facilitate the agent's control of remote applications. This use of the JMX "connector" differs from its defined purpose in the JMX specification. In the JMX architecture, a "connector" is used to expose MBean methods from the agent MBean server to the remote management application. It is a piece of code that plugs-into or connects to the MBean server so that a remote management application can access it. On the client side, the manager would use a "connector" client that understood how to talk to the "connector" server. In this invention, the "connector" is used to communicate between the split agent pieces in addition to the communicate between the agent and the manager level.
Note that the actual method of communication can vary. As an example, this method describes the use of the Java Remote Method Invocation (RMI) for the communication interface of a JMX "connector" (shown in Figure 2 as the boxed C-Rmi).

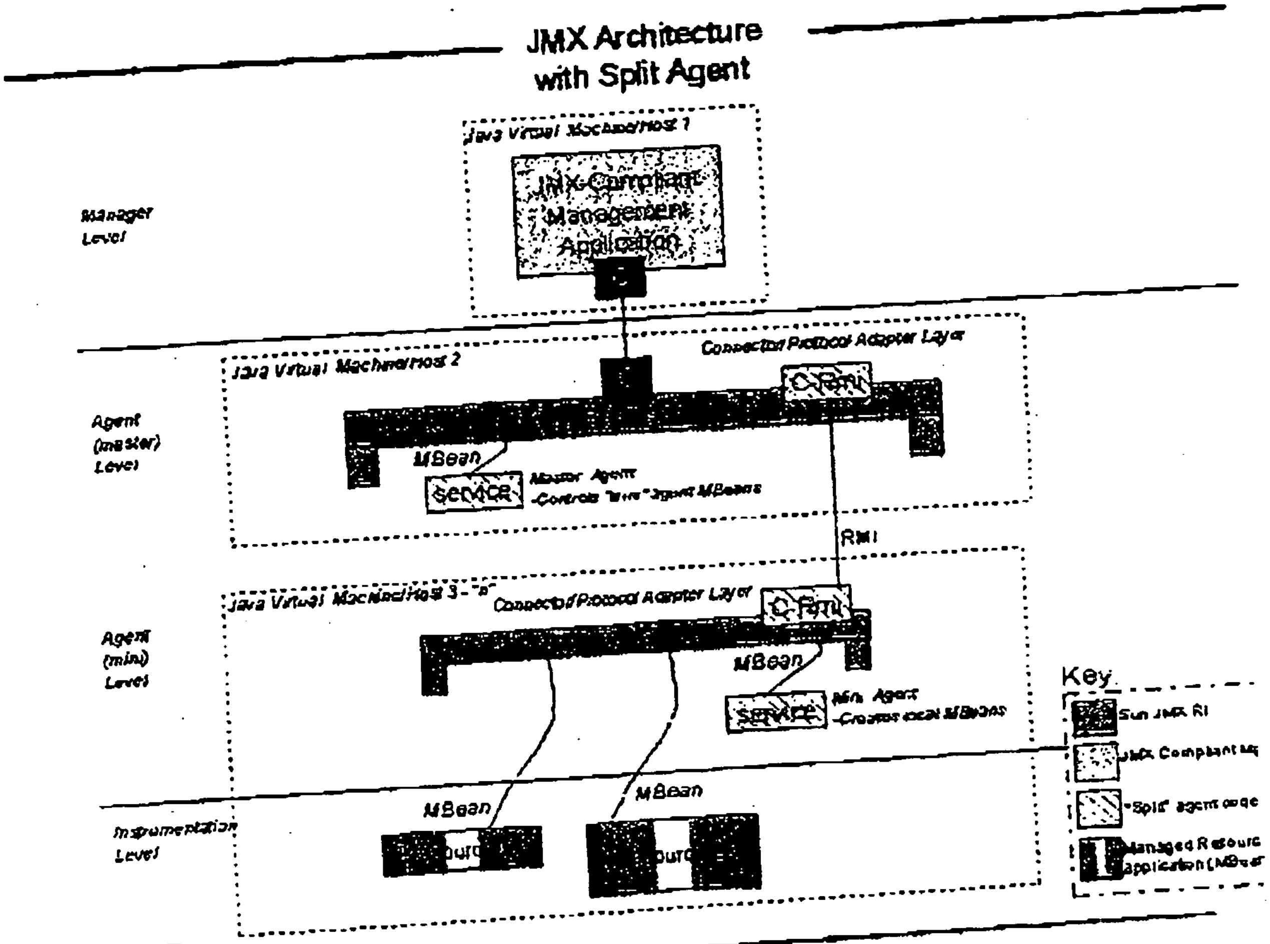

Figure 2

2. How does the invention solve the problem or achieve an advantage, (a description of the "invention", including figures inline as appropriate)?

This invention offers the advantage of using the industry standard JMX architecture for a solution whose application(s) cross process boundaries (JVMs) or host systems (machines on a network). The JMX architecture as defined for a single process application control is not useful for an enterprise solution that involves numerous applications on a network. This invention enables the use of standard JMX where it normally could not be used. No proprietary communications/messaging layer need be developed to support this facility, as it uses the standard JMX "connector" architecture. The use of JMX for application management offers many benefits, such as the use of an industry standard framework for development and a simple light-weight, standard way to instrument Java objects.

3. If the same advantage or problem has been identified by others (inside/outside IBM), how have those

others solved it and does your solution differ and why is it better?

4. If the invention is implemented in a product or prototype, include technical details, purpose, disclosure details to others and the date of that implementation.

This Master/Mini Agent Implementation involves the following process:

1. The JMX Master Agent (Java Application) is started.
2. Master Agent starts the local MBean server and creates local MBeans.
3. Master Agent creates an RmiConnector server. This exposes the MBean server of the Master Agent for both management and Mini Agents to access
4. Master Agent creates a pre-configured number of JMX Mini Agents to act as local proxies to remote Mini Agents
5. Mini Agents are started in the JVM or host of the resource (application)
    1. The Mini Agents can be started by the Master Agent's Mini JMX proxies or started on their own
6. Mini Agents start their local MBean servers and create local MBeans.
7. Mini Agents create RmiConnector servers to expose their MBean server to the Master Agent.
8. Master Agent's local proxies for Mini Agents connect to (as RmiConnector client) remote Mini Agent MBean servers, and the Mini Agents connect back to the remote Master Agent (as RmiConnector clients).
9. Mini JMX Agents and Master JMX Agent are now communicating and can interoperate on each others MBeans remotely

2. How does the invention solve the problem or achieve an advantage,(a description of "the invention", including figures inline as appropriate)?

3. If the same advantage or problem has been identified by others (inside/outside IBM), how have those others solved it and does your solution differ and why is it better?

4. If the invention is implemented in a product or prototype, include technical details, purpose, disclosure details to others and the date of that implementation.

*Critical Questions (Questions 1 - 7 must be answered)

*Question 1
On what date was the invention workable? 02/15/2000 Please format the date as MM/DD/YYYY
(Workable means i.e. when you know that your design will solve the problem)

*Question 2
Is there any planned or actual publication or disclosure of your invention to anyone outside IBM?

○ Yes
● No

If yes, Enter the name of each publication or patent and the date published below.

Publication/Patent:

Date Published or Issued:

○ Yes
● No

Are you aware of any publications, products or patents that relate to this invention?

If yes, Enter the name of each publication or patent and the date published below.

Publication/Patent:

Date Published or Issued:

○ Yes
● No

***Question 3**

Has the subject matter of the invention or a product incorporating the invention been sold, used internally in manufacturing, announced for sale, or included in a proposal?

● Yes
○ No

Is a sale, use in manufacturing, product announcement, or proposal planned?

If Yes, identify the product if known and indicate the date or planned date of sale, announcements, or proposal and to whom the sale, announcement or proposal has been or will be made.

Product: IBM WebSphere Voice Server with Via Voice Technology

Version/Release. 1.0

Code Name:

Date: 3Q2000

To Whom: PRPQ

If more than one, use cut and paste and append as necessary in the field provided.

○ Yes
● No

***Question 4**

Was the subject matter of your invention or a product incorporating your invention used in public, e.g., outside IBM or in the presence of non-IBMers?

If yes, give a date. **Please format the date as MM/DD/YYYY**

○ Yes
● No

***Question 5**

Have you ever discussed your invention with others not employed at IBM?

If yes, identify individuals and date discussed. Fill in the text area with the following information, the names of the individuals, the employer, date discussed, under CDA, and CDA #.

○ Yes
● No
○ Not sure

***Question 6**

Was the invention, in any way, started or developed under a government contract or project?

If Yes, enter the contract number

○ Yes
● No
○ Not Sure

***Question 7**

Was the invention made in the course of any alliance, joint development or other contract activities?

If Yes, enter the following :Name of Alliance, Contractor or Joint Developer

Contract ID number

Relationship contact name

Relationship contact E-mail

Relationship contact phone

○ Yes
● No

Question 8

Have you submitted, or are you aware of, any related disclosure submission?

If Yes, please provide the title and docket or disclosure number below:

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Question 9
What type of companies do you expect to compete with inventions of this type? *Check all that apply.*

□ Manufacturers of enterprise servers
□ Manufacturers of entry servers
□ Manufacturers of workstations
□ Manufacturers of PC's
□ Non-computer manufacturers
□ Developers of operating systems
☒ Developers of networking software
☒ Developers of application software
□ Integrated solution providers
☒ Service providers
□ Other (Please specify below)

Patent Value Tool (Optional - this may be used by the inventor and attorney to assist with the evalu
Post Disclosure Text & Drawings

(Form Revised 12/17/97)